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TUNA FISHING AT TAHITI

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In February of this year the U. S. Fish and Wildlife Service's vessel John R. Manning, operating from Pacific Oceanic Fishery Investigations' Honolulu base and fishing a series of tuna long-lining stations across the equatorial current system on 140° and 150° west longitude, put in at Papeete, Tahiti, for refueling. Some observations of the Tahitian tuna fishery were made with the primary objective of picking up any information on fishing methods which might be applicable elsewhere in the Pacific, particularly in those United States island possessions which need an augmented protein food supply or which are considered potential locations for tuna-cannery development. In this latter connection, interest in the Tahitian situation was heightened by the fact that on another recent POFI cruise some samples of tuna canned in Tahiti were obtained in the Marquesas, and it was anticipated that Tahiti might prove to be a model of an isolated tropical island with a small population and limited technical resources (i. e. like America Samoa) which was nevertheless able to keep a tuna cannery in operation (as Samoa has so notably not been able to do).

It was found, in fact, that the Tahitian tuna fishery is quite primitive in nature, and that it has not proven capable of supporting even a modest canning industry in normal

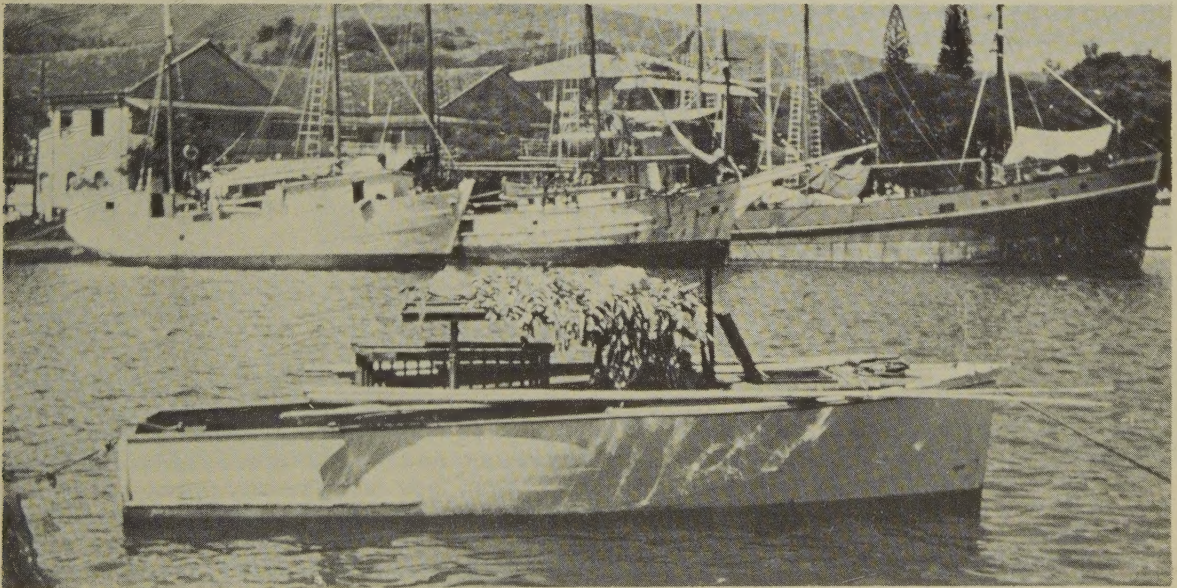


FIG. 1 - A TYPICAL TAHITIAN TUNA BOAT IN PAPEETE HARBOR. NOTE THE FISHING POLES ALONG THE SIDES AND THE BUNDLE OF DRY LEAVES FOR SHADE ON THE COCKPIT CANOPY.

times, although it does supply abundant and fairly cheap fresh fish to the Island's people. The information obtained in the course of a brief stay at Papeete is necessarily incomplete, and is derived more from interviews with local people than from first-hand observation; however, it may be of some general interest in the absence of any more complete accounts.

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The tunas commonly taken at Tahiti are the yellowfin (*Neothunnus macropterus*), called "thon" in French and "a'ahi" in Tahitian, and the skipjack (*Katsuwonus pelamis*), called bonite in French and auhopu in Tahitian. No big-eyed tuna, albacore, or little tuna were seen in the market, nor did the persons interviewed appear to recognize descriptions of these species. Some informants spoke of another kind of tuna called va'o, apparently the dog-toothed tuna, which was said to be abundant around the reefs and passes of the Tuamotus, though less common around the high islands. The yellowfin and skipjack seen in the market and being unloaded from the fishing boats were of very mixed sizes, ranging from an estimated 5 pounds to about 50 or 60 pounds each in the case of yellowfin and to perhaps 40 pounds each for the skipjack. When the observer remarked on the unusually large size (by Hawaiian standards of comparison) of some of the skipjack, he was told that even larger ones--up to 70 pounds--were sometimes brought in. Although this might be an exaggeration, it is interesting to note that a news story in the *Pacific Fisherman* of March 1950 contains a report of three-pole skipjack tuna (75 pounds) taken by a Hawaii-based vessel which fished in the Tahiti area.

The Tahitian tuna boats are of uniform design, about 18 to 25 feet in length, and very much like small sport-fishing cruisers in general appearance. They are powered with 9 to 18 hp. Diesel engines of French manufacture. They carry no ice. The catch is kept on the floor of the small cockpit. Their only water supply is a bottle filled on the quay, and the only visible concession to comfort is a heap of dried leaves on the roof which is supposed to keep the cockpit cool. Each boat carries three fishermen, and there are said to be about 20 such boats at Tahiti, most of them based at Papeete. The boats are almost all owned by people ashore, and the proceeds are split 50-50 between the owner and the fishermen. The operating radius of the fleet is about 30 miles from Tahiti. The normal schedule is to put out to sea at around 8:00 a.m. and return at anywhere from 5:00 p.m. to midnight. The boats fish all around the island of Tahiti, often cross the 8-mile channel to Moorea, and sometimes go as far as the atoll of Tetiaroa, 25 miles north of Tahiti, where the fishermen sleep on the beach all night.

The tuna schools are located by sighting the flocks of birds which accompany them, and the fishing is done with pole and line, using pearl-shell jigs of the traditional Polynesian type. The poles, of which four or five are carried lashed along the gunwales on



FIG. 2 - TAHITIAN TUNA LURES. THE SMALLER HOOK ($3\frac{1}{2}$ INCHES LONG) IS OF THE TYPE USED FOR SKIPJACK, THE LARGER ($5\frac{1}{2}$ INCHES LONG) IS FOR LARGE YELLOWFIN. THE BODY OF THE LURE IS MADE FROM THE THICKEST PART OF A PEARL OYSTER SHELL, THE HOOK IS OF BEATEN COPPER, AND THE TUFT OF PIG BRISTLES AT EACH SIDE OF THE AFTER END IS SUPPOSED TO KEEP THE JIG IN THE PROPER POSITION AS IT IS TRAILED ON THE SURFACE.

each side of the boat, are about 12 to 16 feet long, of a light, thin-walled local bamboo. They are perfectly plain, with no serving or wrapping on the grip. The line is slightly shorter than the pole. While fishing, the boat is kept under way and moving with the school at all times, and the pearl-shell jig is slapped and played on the surface in such a way as to attract the tuna. Live bait is never used, nor is there any spray or splashing of water over the lure. As in all islands where the Polynesian method of tuna fishing is used, it is believed that fine nuances of color in different shell hooks in relation to light conditions and to the color of the natural feed which the tuna are taking have an important effect on the success of the fishing. While on a school, the fishermen change lures frequently in order to find the one which will be most attractive to the fish. Differences in color and sheen imperceptible to the unpracticed eye may give one hook a very high value while another apparently identical one will be considered almost worthless. Pearl shells from certain islands, or from certain spots on the reefs of certain islands, are reputed to make especially effective hooks.

In addition to the jigging of fish from surface schools, large tuna and marlin are sometimes hand-lined from canoes at well-known "tuna holes" ('apo'o a'ahi), some of which are quite close to the reef. Trolling appears to be completely unknown as a commercial fishing method, but occasionally when a boat is fishing a school and large yellowfin tuna show up mixed with the smaller fish they are taken on hand lines with cut bait.

The seasons for tuna fishing at Tahiti are said to be January-March and July-August, but some fish are taken throughout the year. It was reported that the same sizes of fish are present in Tahitian waters at all times of the year. Unfortunately, the seasons of abundance of the tunas coincide with the peak seasons for the atule (big-eyed scad, *Selar crumenophthalmus*), which is generally preferred by the Tahitians. Thus, when big catches of atule and tuna come into the market at the same time, the tuna may be sold at give-away prices, or they may even have to be thrown away. No use is made of refrigeration, nor of salting or sun-drying, to preserve fish. The market closes at 7:00 p.m. and fish brought there after that hour are simply left to hang in very warm air temperature until the next morning. Fortunately there are remarkably few flies in Tahiti, but nevertheless much of the fish consumed around the island looks far from fresh. It may be because of this general staleness of the raw material that the Tahitians prepare most of their tuna or atule by marinating it in lime juice and salt and then serving it in coconut cream. This is the staple fish dish, but large tuna are sometimes baked in the imu or earth oven.

A good day's catch for a Tahitian tuna boat is said to be 20 to 30 40-pound fish, but from the writer's observations a proportionately larger number of 10- to 20-pound fish would be more usual. The fish are tied by the tails with leaves into bunches of 2

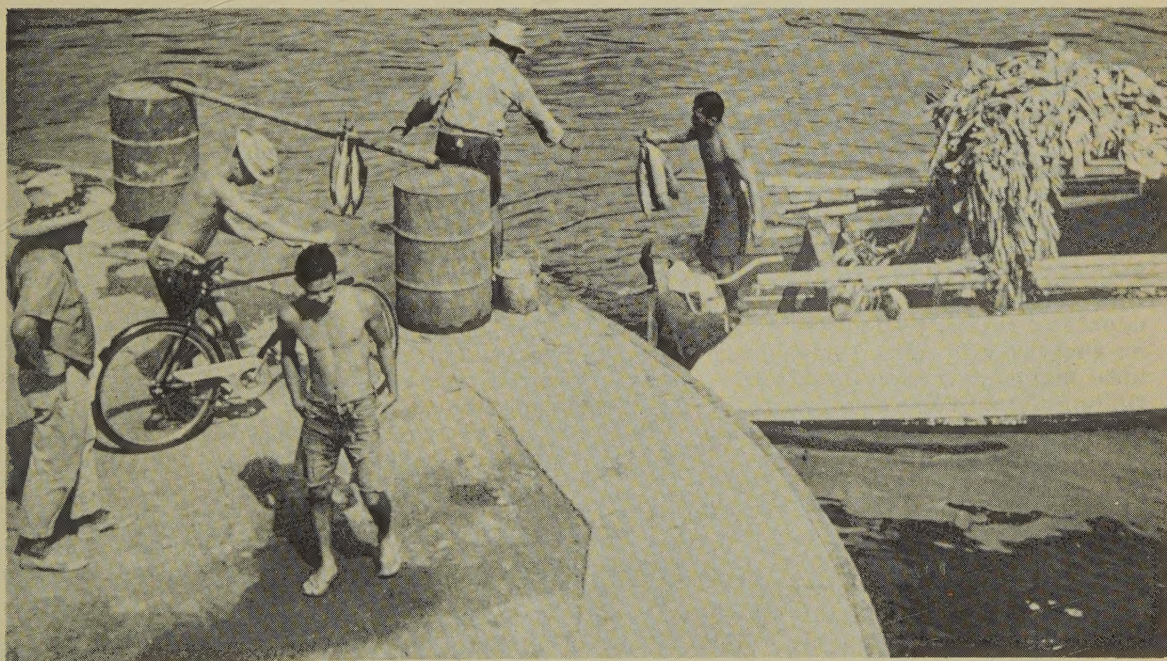


FIG. 3 - TAHITIAN FISHERMEN UNLOADING SMALL YELLOWFIN FROM THEIR BOAT AND HANGING THEM ON A SHOULDER-POLE FOR TRANSPORTATION TO THE MARKET.

to 8 or 10, depending on the size, hung on a carrying pole, and shoulder-carried about 3 blocks from the quay to the market. At the public market (a concrete-floored, open-sided structure extending clear across one city block) the fish are hung up on iron rails and sold by the fishermen or their womenfolk. No scales are used to weigh the fish. They are sold individually for the most part. Smaller ones are sold by the bunch and the larger tuna are halved or quartered. Prices are arrived at by haggling at each sale, and may vary considerably between the opening and closing of the market. A fair aver-

age was quoted as 40 to 60 francs (65¢ to \$1.00) for a 10-pound tuna. The busiest time at the market is early Sunday morning, when the people who have come into town for Saturday night are purchasing fish and other foodstuffs to take back to the country with them. At such times the market is the scene of extremely spirited activity, and the guards are sometimes hard put to it to maintain order in the surging mob of competing shoppers. Aside from such traffic-directing duties, the chief concern of the market attendants seem to be to see that all fish are hung off the floor on the iron rails provided for that purpose.

A small cannery formerly packed tuna at Papeete, and this was the source of the samples obtained by POFI personnel in the Marquesas. The plant was established in 1939 in connection with a scheme for a pineapple industry, and when this fruit proved to be unsuited to Tahiti's humid climate, the facilities were converted to the processing of yellowfin and skipjack tuna. The pack was put up in tall salmon cans, and most of it was canned in coconut oil, although some imported salad oil was used. The operator used as much hand labor as possible, since labor is fairly cheap in Tahiti, and worked up to a capacity of about 2 tons per day and an output of 2 to 3 thousand cases per year. The average price paid for the fish ran around \$80 a ton. No one connected with the enterprise seems to have had any experience in fish packing, and the product, which was not a solid pack, was probably rather crude and variable, but in the years immediately after World War II, when food of any sort was in short supply in Europe, the business prospered. The bulk of the pack was always sent to France. Only a small amount of skipjack in coconut oil was sold in French Oceania.

With the return of normal market conditions in France, this unorthodox product became less saleable, and the cannery finally ceased operations in 1947. The machinery has been dismantled and stored, and has been up for sale for several years. The former operator ascribes the failure of the enterprise to the irregular and unpredictable supply of fish, the reluctance of jobbers to handle such a small number of cases, and the effects of unsettled world conditions and transportation difficulties on his supply of imported materials, chiefly tin plate.

The story of tuna canning in Tahiti is in part merely a repetition of the same sad tale which has been heard from other Pacific islands where the development of a tuna industry has been tried--"no bait." Without the use of live bait, not enough fish could be taken out of the surface schools to keep the cannery supplied, and the local fishermen lacked the knowledge and probably the capital to try long-lining. Vessels from Hawaii with experienced live-bait fishermen prospected in Tahitian waters, but were unable to find any adequate source of bait. Whether or not a tuna-canning industry can be supported by long-line fishing in the central Pacific is a question which must wait until someone makes the attempt, but the Tahitian experience seems to indicate that fishing the surface schools by the Polynesian method, without the advantage which live-bait confers, will not give enough return per unit of effort to produce a surplus of fish for canning.

On the other hand, the existing tuna fishery at Tahiti is evidence of the fact that an adequate supply of fresh tuna for an island population's needs can be obtained in the ancient Polynesian way even in the absence of a live-bait supply. Islands where the supply of protein food is inadequate, where there are suitable stocks of tunas in nearby waters, and where the natives are willing to exert themselves to catch tuna and to eat them once they are caught, would appear to be promising locales for the introduction (or reintroduction) of this method of fishing.



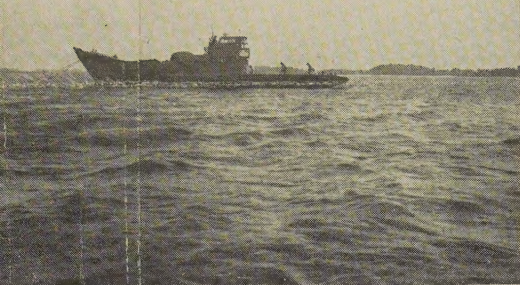
Sampan from Hawaii

Makes Visit to

LINE ISLANDS



Hooking and landing a "6-pole" yellowfin on "The Tradewind"
Fanning Island, February 1953



The sampan, *Tradewind*, at anchor in the lagoon, Palmyra Island, January 1953.

Sampan from Hawaii

Makes Visit to

LINE ISLANDS

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the possibilities at Kingman Reef, but tuna was sparse and sharks were numerous enough to constitute a dangerous nuisance.

In hopes of finding a better supply of bait the *Tradewind* then proceeded to Christmas Island. Numerous skipjack schools were present close-in to the island, but no yellowfin schools were sighted. Initial baiting attempts yielded primarily goatfish eight to 20 inches in length, which were too large to work the skipjack schools.

The crew then turned to reef fishing and in four days caught about 2 ton of "papio" (one of the jacks, or pompano-like fishes), a highly prized fish in the Honolulu markets. A later attempt to catch bait yielded about 300 lbs. of mullet, but as there were apparently no yellowfin in the area the vessel ran back to Fanning Island.

During the stay at Fanning a fair amount of bait (about 850 lbs. of mullet and small milkfish) was obtained from the lagoon, resulting in the capture of about 6½ tons of yellowfin from along the west side of the island. The tuna schools were small and few in number, however, and the sharks, which are very abundant in these waters, tended to discourage the tuna from approaching closely to the stern of the boat.

An accounting of the time from departure from Honolulu on January 8 to return on February 12, shows that 13 days were spent in running, seven days baiting, eight days tuna fishing, four days market fishing, two days transferring fish, fuel, and supplies between the *Tradewind* and the *Smith*, and on two days the vessel was weather-bound.

The total catch was approximately 13½ tons of yellowfin and about 2 tons of "papio." Most of the yellow-

TUNA fishing on a commercial basis was conducted in the area of the Line Islands during January and February, 1953, by the *Tradewind*, an 80-ft. sampan typical of Hawaii's pole-and-line tuna fleet. This vessel, owned by the Tradewind Fishing Company of Kauai, was captained on the expedition by Mr. Junji Higaki and manned by a crew of eight.

The Line Islands lie about 1,000 miles south of the Hawaiian Islands and are beyond the present range of Hawaii's fishing vessels (see accompanying chart). The trip of the *Tradewind* was the first attempt of a Hawaii-based sampan to live-bait fish for tuna in the area. The *Oregon*¹, operated by the Pacific Exploration Company, prospected for tunas in the Line Islands in February 1948. Some bait fish, consisting of mullet and goatfish, were obtained from the island lagoons; several schools of skipjack and a few schools of yellowfin were worked but with little success. The *Calistar*², a West Coast tuna clipper, visited the Line Islands on an exploratory fishing cruise in February 1949. With bait brought with them from the West Coast, they managed to catch about 50 tons of yellowfin at Fanning Island and 15 tons of yellowfin at Palmyra Island.

The Pacific Oceanic Fishery Investigations of the Fish and Wildlife Service, with headquarters in Honolulu, has carried on experimental fishing in the Line Islands employing live-bait, longline, trolling and purse-seine. The results of these studies indicated that the waters in the vicinity of the Line Islands were rela-

tively high in tuna abundance and could possibly support a small-scale fishery.

Since this organization was interested in observing the success of a commercial venture in the area the research vessel *Hugh M. Smith* was assigned to transport fuel and ice for the sampan and to freeze her catch of fish. During three weeks that the sampan fished, the *Smith* carried out a hydrographic and longline fishing survey around the islands.

The *Tradewind* began fishing at Palmyra Island (January 12 to 24), then shifted to Christmas Island (January 26 to February 3), and ended up at Fanning Island (February 4 to 7). The locations of fishing areas are shown on the accompanying chart. Palmyra is the northernmost of the Line Islands (except for the barely emergent Kingman Reef) and the nearest to Honolulu. During 12 days spent there the *Tradewind* managed to obtain about 1,000 lbs. of live-bait, and caught about seven tons of yellowfin tuna.

Numerous schools of yellowfin and one mixed school of yellowfin and skipjack were seen within 15 miles of the island. The chief factor limiting the tuna catch was the scarcity of bait. Mullet of two species, three to 10 inches long, were the only bait fishes available in the accessible areas of the lagoon and outer beach and the supply of these soon ran out.

One day was spent investigating

¹Smith, O. R., and M. B. Schaefer. Fishery exploration in the western Pacific (January to June, 1948, by vessels of the Pacific Exploration Company). U. S. Fish and Wildlife Service Commercial Fisheries Review, Vol. 11, No. 3, p. 1-18, 1949.

²Anonymous. *Calistar* finds tuna in mid-ocean, but fish are wild and bait scarce. Pacific Fisherman, Vol. 47, No. 6, p. 47, 49, 1949.

fin schools were mixed as to size of fish with individuals ranging from five to 190 pounds, but the average for the trip was about 15 pounds.

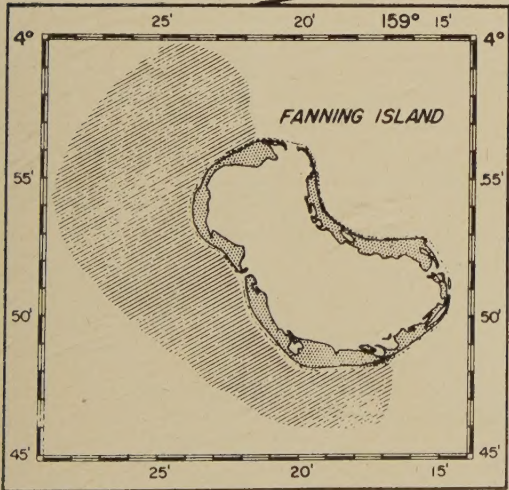
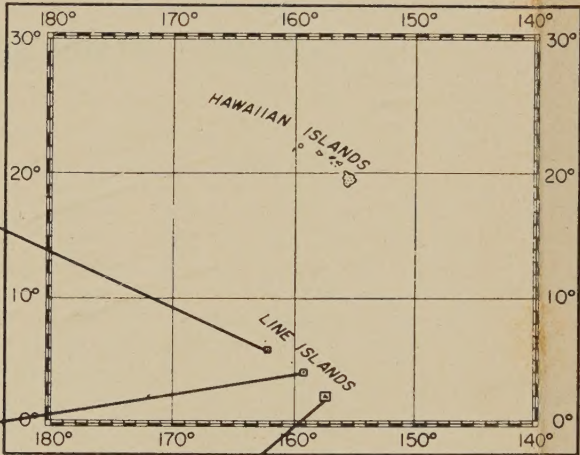
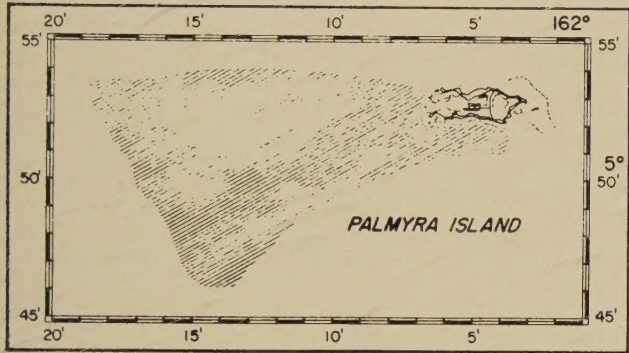
The weather encountered during the cruise varied from unfavorable conditions of rain, poor visibility, and rough seas experienced at Palmyra and Christmas Islands during the early part of the cruise, to excellent weather and calm to moderate seas during the stay at Fanning Island and on the run home.

The Line Islands are of sufficient size to provide lees where vessels can obtain shelter if necessary. All the islands have fair anchorages, but Palmyra is the only island of the group with a navigable channel (depth about 5 fathoms) into the lagoon and dock facilities for fishing vessels. Fresh water and, usually, fuel can be obtained here.

Palmyra Island and Kingman Reef
(Continued on next page)



Live-bait fishing for 10 to 20 pound yellowfin tuna with 1- and 2-pole rigs; Fanning Island, February 1953.



Map of the central Pacific Ocean showing the relation of the Hawaiian and Line Islands. The areas shaded indicate where tuna scouting and fishing was conducted by the Tradewind.



The Tradewind crew making a haul for bait along outer beach; Palmyra Island, January 1953.

Sampan Visits Line Islands

(Continued from preceding page)

are U. S. possessions, Fanning and Washington Islands are British owned, and both countries claim Christmas Island. Therefore a fishing vessel wishing to work throughout the area can expect to encounter difficulties in securing baiting and fishing rights in certain of the islands. Another complicating detail is the fact that fish caught within the recognized boundaries of the British-owned islands must be declared as foreign cargo upon entering any U. S. port.

This cruise of the *Tradewind* and previous surveys of the Fish and Wildlife Service demonstrate that considerable numbers of tuna are present both at the surface and in the subsurface waters of the Line Islands group during the winter months, the off-season in the Hawaiian skipjack fishery.

If the 13½ tons of tuna caught by the *Tradewind* is compared to the 4½ tons which a boat would normally catch in a month in Hawaii from December through March (based on records of the Territory of

Hawaii for the past five winters, it would seem to be quite beneficial to the Hawaiian tuna industry to have at least part of its fleet operating in the Line Islands area during this period.

Before this can be done, however, there are several problems to consider. The average sampan has a capacity of only 15 tons, no mechanical refrigeration facilities, an insufficient range for such a long trip, and no qualified navigator.

One possible solution to these problems would be to have several boats fishing together accompanied by a tender. The scarcity of bait poses another problem. A promising bait substitute which the University of Hawaii is attempting to develop under the auspices of the Fish and Wildlife Service may eventually remedy this situation.

Thus it appears that the present barriers to the exploitation of tuna in the Line Islands may possibly be hurdled to permit profitable winter trips for a limited number of Hawaii-based vessels. *